

REMARKS

Claims 1 and 12 are amended. Claims 1-16 are pending in the application.

Claims 1-3 stand rejected under 35 U.S.C. § 102(e) as being anticipated by either of Mukhopadhyay, U.S. Patent No. 6,399,448, and Yu, U.S. Patent No. 6,110,780. The Examiner is reminded by direction to MPEP § 2131 that anticipation requires each and every element of a claim to be disclosed within a single prior art reference. Claims 1-3 are allowable over each of Mukhopadhyay and Yu for at least the reason that neither of these references discloses each and every element of any of those claims.

As amended, independent claim 1 recites providing a semiconductor substrate having an exposed silicon surface and forming a nitrogen-comprising surface region which extends greater than 0 Angstroms and no greater than 10 Angstroms beneath the silicon surface. The amended claim 1 is supported by the specification at, for example, page 7, line 17 through page 8, line 5 and Fig. 4. Mukhopadhyay discloses forming an oxide layer 12 over a semiconductor substrate 11 and implanting nitrogen into substrate 11 through oxide layer 12 (Fig. 1, and the corresponding text at col. 4, ll. 9-48). Mukhopadhyay does not disclose or suggest claim 1 recited forming a nitrogen-comprising surface region layer across an exposed silicon surface of a semiconductor substrate, the surface region extending greater than 0 Angstroms and no greater than 10 Angstroms beneath the silicon surface. Accordingly, independent claim 1 is not anticipated by Mukhopadhyay.

Yu discloses forming a nitrogen-containing silicon oxide film by exposing a wafer to a nitrogen treatment which includes a furnace treatment or rapid thermal processing (col. 2, l. 65 through col. 3, l. 6). Yu does not disclose or suggest the claim 1 recited forming a nitrogen-comprising surface region layer across at least some of an exposed silicon surface of a semiconductor substrate, the surface region extending greater than 0

Angstroms and no greater than 10 Angstroms beneath the silicon surface. Accordingly claim 1 is not anticipated by Yu.

Dependent claims 2-3 are not anticipated by Mukhopadhyay or Yu for at least the reason that they depend from allowable base claim 1.

Dependent claims 4-11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over either of Yu and Mukhopadhyay, in view of Okuno, U.S. Patent No. 6,110,842. The Examiner is reminded by direction to MPEP § 2143 that a proper obviousness rejection has the following three requirements: 1) There must be some suggestion or motivation to modify or combine reference teaching; 2) there must be a reasonable expectation of success; and 3) the combined references must teach or suggest all of the claim limitations. Claims 4-11 are allowable over the cited combinations of Mukhopadhyay, Yu and Okuno for at least the reason that the references, individually or as combined, fail to disclose or suggest each and every limitation in any of those claims and fail to provide a basis for a reasonable expectation of success.

As discussed above, independent claim 1 is not anticipated by either Mukhopadhyay or Yu. Further, neither Mukhopadhyay nor Yu suggests the claim 1 recited forming a nitrogen-comprising surface region layer across at least some of an exposed silicon surface of a semiconductor substrate, the surface region extending greater than 0 Angstroms and no greater than 10 Angstroms beneath the silicon surface. Nor does either Mukhopadhyay or Yu provide a basis for a reasonable expectation of achieving the claim 1 recited forming a nitrogen-comprising surface region layer across at least some of an exposed silicon surface, the surface region extending greater than 0 Angstroms and no greater than 10 Angstroms beneath the silicon surface. Accordingly, independent claim 1 is not rendered obvious by either of Mukhopadhyay and Yu.

Okuno discloses plasma nitridation of a gate dielectric 42 (col. 4, lines 42-63), or nitridation of an exposed portion of a substrate 10 (col. 3, line 47 through col. 4 line 9). Fig. 4 of Okuno shows the depth of nitridation utilizing the disclosed methods. This figure clearly indicates that the disclosed nitridation is not limited to within the first 10 Angstroms beneath the surface. Accordingly, as combined with either of Mukhopadhyay and Yu, Okuno does not contribute toward suggesting the claim 1 recited forming a nitrogen-comprising surface region layer across at least some of an exposed silicon surface, the surface region extending greater than 0 Angstroms and no greater than 10 Angstroms beneath the silicon surface. Further, Okuno does not contribute toward providing a basis for a reasonable expectation of achieving the claim 1 recited nitrogen-comprising surface region layer. Independent claim 1 is therefore not rendered obvious by the cited combinations of Okuno and either of Mukhopadhyay or Yu, and is allowable over these references.

Dependent claims 4-11 are allowable over the cited combinations of Mukhopadhyay or Yu and Okuno for at least the reason that they depend from allowable base claim 1.

Claims 12-16 stand rejected as being unpatentable over Yu or over Yu as combined with Okuno. As amended independent claim 12 recites forming a nitrogen-comprising layer across at least some of a first oxide region and across at least some of a semiconductor substrate that is not covered by the first oxide region, the nitrogen-comprising layer extending greater than 0 Angstroms and less than or equal to about 10 Angstroms beneath the surface of the first oxide region, and extending greater than 0 Angstroms and less than or equal to about 10 Angstroms beneath the surface of the semiconductor substrate not covered by the first oxide region. The amendment to claim 12 is for clarification and is not intended to limit the scope of the claims. Independent claim 12

is allowable over Yu and Okuno for at least reasons similar to those discussed above with respect to independent claim 1.

Dependent claims 13-16 are allowable over Yu and Okuno for at least the reason that they depend from allowable base claim 12.

For the reasons discussed above claims 1-16 are allowable. Accordingly, Applicant respectfully requests formal allowance of pending claims 1-16 in the Examiner's next Action.

Respectfully submitted,

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